POLICY facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Strategic Center for Natural Gas

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SIGNIFICANCE OF HYDRAULIC FRACTURING IN MEETING U. S. NATURAL GAS SUPPLY REQUIREMENTS

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Description

Hydraulic fracturing is a widely employed method for enhancing the flow of oil and natural gas from underground formations. It is projected that a significant portion of the United States' (U.S.') future supply of natural gas will be produced from formations that typically require hydraulic fracturing in order to produce at economical rates. Given this situation, and the fact that $1 billion or more will be spent each year on hydraulic fracturing, it is imperative that a critical review of the process be undertaken. The Strategic Center for Natural Gas (SCNG) and the National Petroleum Technology Office (NPTO) at the U.S. Department of Energy's National Energy Technology Laboratory (DOE/NETL) are undertaking this comprehensive and much needed assessment of hydraulic fracturing. Results of the assessment are expected in spring 2002 and will benefit: product planning, policy development, and overall strategy formulation for natural gas resource development.

Photograph courtesy of Schlumberger

Equipment at the wellsite during hydraulic fracturing operations

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Significance of Hydraulic Fracturing in Meeting U. S. Natural Gas Supply Requirements

RELEVANT INVOLVED PARTIES

Oil & Gas Producers

Industry Trade Organizations

Oilfield Service Industry

State and Federal Agencies

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www.eia.doe.gov

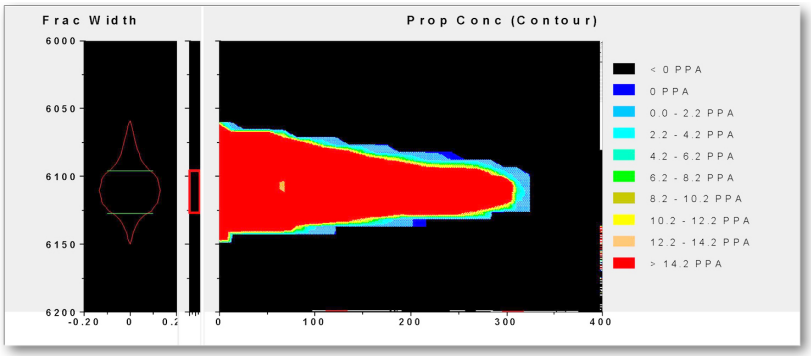
Interstate Oil and Gas Compact Commission
www.iogcc.state.ok.us

Gas Technology Institute
www.gastechnology.org

Society of Petroleum Engineers
www.SPE.org

Background

The exploration and production (E&P) sector of the petroleum industry has relied on hydraulic fracturing for decades to commercially develop natural gas resources that are not economically viable at "natural" flow rates and to improve the return on investment for other natural gas plays. Major oil and gas companies, oilfield service contractors, and the federal government all recognize the importance of fracturing operations and have substantially contributed to the knowledge base on the process. The fundamental understanding of the physics and theory of hydraulic fracturing as well as rock mechanics have evolved to where sophisticated 2-dimensional (2-D) and 3-D models are routinely employed to design, pump, and analyze treatments.



Geometry of created hydraulic fracture predicted from 3-D model
(cross-sectional view)

By most accounts, natural gas demand in the U.S. is expected to significantly increase during the next two decades, from 22 trillion cubic feet (Tcf) in 1999 to nearly 34 Tcf in 2020. The Energy Information Administration projects that more than 20,000 gas wells will have to be drilled in 2020 to meet this demand, up substantially from the 10,300 wells successfully drilled and completed in 1999. Further, during 1999, the oil and gas industry spent $850 million to perform about 20,000 fracture stimulation treatments throughout North America. To meet the growing demand for new natural gas supplies, several tens of thousands of fracture stimulation treatments will have to be pumped each year at an approximate annual cost of $2 billion.

Significance/Potential Impacts

To fully understand the implications of increased use of hydraulic fracturing in the U.S., the SCNG and the NPTO have initiated this comprehensive review and analysis. This study will establish the baseline contribution and future impact of hydraulic fracturing for supplying natural gas throughout the U.S. The assessment has been designed in a disciplined manner and its results will provide:

- Insights into the types of fracturing currently employed in various natural gas resource categories.
- Perspectives on the significance of the hydrocarbon reservoir stimulation process and its impact on future natural gas commodity volumes and prices.
- Guidance and direction for future RD&D.